



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/583,183	03/12/2007	Maurice Morency	2003390-0031	8998
24280 7590 12/22/2011 CHOATE, HALL & STEWART LLP TWO INTERNATIONAL PLACE BOSTON, MA 02110				
EXAMINER				
TAKEUCHI, YOSHITOSHI				
ART UNIT		PAPER NUMBER		
1726				
NOTIFICATION DATE		DELIVERY MODE		
12/22/2011		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@choate.com

jhess@choate.com

# Office Action Summary

**Application No.**

10/583,183

**Applicant(s)**

MORENCY ET AL.

**Examiner**

YOSHITOSHI TAKEUCHI

**Art Unit**

1726

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 September 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 5) ☒ Claim(s) 1-4, 6-21 and 31-33 is/are pending in the application.
- 5a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 1-4, 6-21 and 31-33 is/are rejected.
- 8) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 16 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-SB/USP)  
Paper No(s)/Mail Date \_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_

### **DETAILED ACTION**

1. Claims 1-4, 6-21, and 31-33 are presented for examination. Claims 5 and 22-30 are cancelled.
2. The prior 35 U.S.C. § 103(a) rejections are withdrawn as a result of the applicants' arguments and the submission of a complete copy of Jebrak. However, Jebrak is reapplied as provided *infra*.

#### ***Continued Examination Under 37 CFR 1.114***

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 13, 2010 has been entered.

#### ***Response to Declaration Under 37 CFR § 1.132***

4. The declaration under 37 CFR 1.132 filed September 13, 2010 is insufficient to overcome the rejection of claims 1-10, 16, 31 and 32 over Jebrak in view of Matthews; and 11-15, 17-21, and 33 over Jebrak in view of Matthews and Hitzrot as set forth in the last Office action for the following reasons.

The examiner respectfully notes that the evidence provided is insufficient to support a finding of unexpected results. Since a *prima facie* case of obviousness is established, the burden shifts to the applicant to come forward with arguments or evidence to rebut the *prima facie* case. See e.g., In re Dillon, 919 F.2d 688, 692 (Fed. Cir. 1990).

First, unexpected results may be established by a direct comparison of the claimed invention with the closest prior art that is commensurate in scope with the claims. An applicant does not have to test all the compounds taught by the reference, however, where an applicant tests less than all cited compounds, the test must be sufficient to permit a conclusion respecting the relative effectiveness of applicant's claimed compounds and the compounds of the closest prior art. MPEP §§ 716.02(e) and 2145.

Here, insufficient evidence was provided, since a conclusion cannot be made respecting the relative effectiveness of applicants' claimed compounds and the compounds of the closest prior art. The claimed surfactant in independent claim 1 is a phosphate surfactant. However, the only phosphate surfactant tested is sodium metaphosphate. The instant specification indicates that sodium metaphosphate provides "additional advantages" over those of other phosphates, such as converting the "calcium and calcium hydroxides present in the liquid phase into a calcium phosphate which is precipitated with the solid. Therefore, this form of calcium sequestering allows for a quicker and sharper fractionation of the slurry" (5:3-7).

It is unclear whether the results provided in the declaration are as a result of the phosphate being sodium metaphosphate. If the only phosphate to "disperse the ferrite particles adsorbed on magnetite particles and sequester calcium compounds" is sodium metaphosphate, then claims 6 and 31-32 are not patentably distinguishable from claims 7-8.

Furthermore, the examiner respectfully refers to the instant specification, which that the "use of an anionic surfactant was found to increase the efficiency and quality of further separation steps" (4:9-10, emphasis added), wherein the "the anionic surfactant is preferably added in a concentration sufficient to reduce the zeta potential to or close to the isoelectric

point.... The anionic surfactant is preferably a phosphate or an equivalent thereof (4:23-5:2, emphasis added), indicating that all anionic surfactants, not just phosphate surfactants, would result in similar properties, and furthermore that other surfactants are equivalent to phosphate surfactants. Additionally, the instant specification suggests other phosphates, and not merely sodium metaphosphate sequester calcium (23:17-23).

Second, the unexpected property or result must actually be unexpected and of statistical and practical significance. MPEP 716.02(a).

Here, the declarant's evidence of unexpected results is insufficient to rebut the *prima facie* case since the declarant failed to state the results are unexpected. Furthermore, while the applicants' representative argued in the Response section that the evidence is unexpected, arguments of counsel are not evidence. See e.g. Ex Parte Uchida Appeal 2011000486.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

6. Claim **20** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitation "first and second finer" in "purifying the first and second finer fractions by suspending residual contaminants" indicates that there is a third fraction, which is less fine than the first or second fractions. However, claim 17 only has two fractions, "a first finer fraction with particles having a grain size of 6 gm or less; and a coarser fraction with particles having a grain

size greater than 6 gm (claim 17).” As a result, it is not clear from what the applicants are distinguishing the first and second fractions.

For purposes of examination, the examiner treats claim 20 to treat the finer and coarser magnetite-containing fractions of claim 17 by the process of claim 20.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-4, 6-10, 16, and 31-32 are rejected under 35 U.S.C. 103(a) as being obvious over Jebrak (Jebrak et al, Characterization of Steel Dust from the Sorel-Tracy Region and Technologies for their Treatment, Centre de Recherche en Environnement (1993) in view of Itoh et al (Itoh et al, Anomalous Increase of Coercivity in Iron Oxide Powder Coated with Sodium Polyphosphate, 1385-87 IEEE Trans. on Magnetics 13 (1977)) and in the alternative in view of Hwang (US 5,047,145).

***Hydrological Separation of Ferrite and Magnetite from EAF Dust Components***

Jebrak teaches large amounts of dust, which consist of iron and a variety of heavy metals, are generated by electric arc furnaces (page i, ¶¶ 1-4, wherein it is well known that heavy metals are toxic). As a result, companies are researching means of extracting the polluting fraction and using the remaining dust, micron-sized particles of ferrite and magnetite, in industrial processes (id at ¶7). Such means include hydrometallurgical magnetic separation used with dispersants to make pigments for use in paints, ceramics, concrete, and powder metallurgy (page ii ¶¶ 5-6) and expressly allows for optimization of the process (page iii ¶2).

a. Regarding claim 1, Jebrak teaches a hydrometallurgical process for the treatment of steel mill electric arc furnace (EAF) dust, the process comprising the steps of:

(a) washing the EAF dust in water and a commercial additive (26:6-7). Jebrak also teaches using wet drums for magnetic separation at an industrial scale (3:8), so it would have been obvious to use wet drums to “agitate” the washing at an industrial scale. The limitation “to dissolve soluble salts, metal and simple oxides contained in the dust” is expected since Jebrak teaches a substantially similar composition and process (EAF dust washed and separated in water). MPEP § 2112.01(I).

*In the alternative*, Jebrak teaches a different embodiment wherein the first washing is with methanol and a second washing is with water to disperse the particles (2:3-3:4 and Figure 8.2, wherein the second washing meeting the limitation of washing in “water”). Since Jebrak teaches two washings, it would have been obvious to use three or more washings to further purify the non-contaminated slurry.

(b) and (c) magnetically separating the solution of step (a) (3:2), which would be expected to result in a magnetic liquid and a non-magnetic liquid. Nothing in the claim requires the decanting and separating steps to be separate, so the magnetic separation is interpreted to meet both steps.

*In the alternative*, separating the feed into magnetic and non-magnetic fractions (Figure 8.2 and 3:8, Eriez).

*Note*: repeated washings and magnetic separations (a) through (c) would have been obvious since Eriez suggests multiple washes and separations would enhance the quality of the non-contaminated slurry (6:2 and Figure 8.2).

(d) adding “a deflocculant responding to the electrochemical properties of the powder,” wherein “optimization of this method will involve measuring the iso-electric properties of different dusts in view of choosing the appropriate additive and its required quantity” (3:5).

(e) using non-contaminated ferrite and magnetite in industrial products (page i ¶7) such as pigments (page ii ¶6), which result from further treating of the non-contaminated slurry (3:4 and 6:2, second or subsequent washing and separation steps).



Regarding step (a), Jebrak does not expressly teach the EAF dust containing “agglomerates of small ferrite particles and larger magnetite particles, the ferrite particles coating by adsorption the larger magnetite particles, the dust further containing calcium oxide, zinc oxide and a toxic amount of leachable lead together with minor elements selected from the group consisting of Mg, Cr, Cu, Cd, V, and chlorides.” However, said components would be expected since Jebrak teaches the same starting material, EAF dust. MPEP § 2112.01(I).

Still regarding step (a), Jebrak does not expressly teach the washing “with an alkaline pH.” However, the alkaline pH would have been expected since Jebrak teaches the same composition (EAF dust) treated in a substantially similar manner (see *supra*) as the instant invention (see instant specification 4:12-13, teaching the alkaline pH results from the first washing in water). MPEP § 2112.01(I).

Regarding steps (b)-(c), Jebrak does not expressly teach the separation step results in “a supernatant liquid containing the dissolved salts, metals and simple oxides, and a slurry containing ferrites and magnetites, a non toxic amount of leachable lead and a reduced amount of calcium.” However, it would be expected since Jebrak teaches a substantially similar composition (EAF dust) treated by a substantially similar process (see *supra*, washing and then magnetic separation). MPEP § 2112.01(II).

Regarding step (d), Jebrak teaches using “a deflocculant responding to the electrochemical properties of the powder,” wherein “optimization of this method will involve measuring the iso-electric properties of different dusts in view of choosing the

appropriate additive and its required quantity” (3:5), but does not expressly teach the deflocculant being “a phosphate.”

However, Itoh teaches treating magnetite with sodium metaphosphate increases the coercivity, which is inversely proportional with magnetization, by a factor of two or three (1385:1-3 and 7). Furthermore, Itoh teaches the sodium metaphosphate can be washed off and the magnetic properties restored to the magnetite (1386:1). As a result, it would have been obvious to a person of ordinary skill at the time of the invention to use the sodium metaphosphate of Itoh to more easily disperse the magnetic agglomerates of ferrite and magnetite in the Jebrak slurry since Itoh teaches the dispersant reduces the magnetization and may be reversed by removal of the dispersant.

Since Jebrak as modified teaches a substantially similar composition and process (see *supra*), the limitation “to disperse the ferrite particles adsorbed on the magnetite particles and sequester calcium compounds” would be expected. MPEP § 2112.01(I).

*In the alternative*, Hwang teaches a method of forming pigments (3:56) from fly ash waste material (1:7-9, wherein it is well known that fly ash contains both ferrite and magnetite). Hwang teaches forming an aqueous slurry mixture of fly ash material, separating a first magnetic fraction of the slurry from the non-magnetic portion (2:9-16), wherein a dispersant, such as a phosphate and preferably sodium tripolyphosphate, is added for better incorporation of the fly ash, which includes ferrite and magnetite, into the aqueous slurry (2:37-42). As a result, it would have been obvious to a person of ordinary skill at the time of the invention to use a phosphate dispersant, such as sodium

tripolyphosphate, in the Jebrak method in order to better incorporate the ferrite and magnetite into the slurry, as taught by Hwang.

Since Jebrak as modified teaches a substantially similar composition and process (see *supra*), the limitation “to disperse the ferrite particles adsorbed on the magnetite particles and sequester calcium compounds” would be expected. MPEP § 21112.01(I).

Furthermore, Jebrak teaches adding a deflocculant to the wash, but does not teach adding the deflocculant to the slurry obtained in step (c). However, selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. MPEP § 2144.04(IV)(C).

b. Regarding claim **2**, Jebrak as modified teaches the method of claim 1, wherein Jebrak teaches adding a deflocculant to the wash and the sequence of steps (a) to (c) is performed more than one time (see *supra*), but does not teach adding the deflocculant to the slurry after steps (a)-(c) are repeated. However, selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. MPEP § 2144.04(IV)(C).

c. Regarding claims **3-4**, Jebrak as modified teaches the method of claim 1, wherein Jebrak teaches the electrochemical properties of the powder and choosing the dispersant and amount of dispersant to optimize the iso-electric property, but does not expressly teach “the solution obtained in step (a) has a positive zeta potential, and the phosphate is added in a concentration sufficient to reduce said zeta potential to or close to the isoelectric point” or “said zeta potential is reduced to the isoelectric point.” However, Jebrak teaches the use of an appropriate deflocculant (3:5) and separating different

mineral phases after neutralization of the charge effect at the particles' surface (1:5). By neutralizing the charge effects of the particles, the zeta potential (the degree of repulsion between adjacent, similarly charged particles) is reduced to zero, which is the isoelectric point, the point where molecules carries no net electric charge.

In the alternative, Jebrak teaches the dust's isoelectric point is result effective of the choice of dispersant and its concentration, so it would have been obvious to optimize the zeta potential as claimed (see also instant specification 4:24-26). MPEP § 2144.05.

In the alternative, said properties would be expected since Jebrak as modified teaches the same composition (EAF dust with anionic surfactant) made by the same process (washing, see *supra*). MPEP § 2112.01(I).

---

***Dispersant Is Sodium Metaphosphate***

- d. Regarding claim 6, Jebrak as modified teaches the method of claim 1, wherein the phosphate comprises sodium metaphosphate (see *supra*).
- e. Regarding claim 31, Jebrak as modified teaches the method of claim 6, wherein Jebrak teaches step (e) may comprise magnetically separating the slurry into a first fraction composed essentially of ferrites and a second fraction composed essentially of magnetite, the first fraction being less magnetic than the second fraction (6:1, wherein ferrite requires 1000 gauss and magnetite requires 500 gauss to separate, so ferrite is less magnetic than magnetite). Jebrak does not expressly teach the ferrite being brown or magnetite being black, but said properties are expected since they are the same compositions. MPEP § 2112.01(I).

f. Regarding claim 32, Jebrak as modified teaches the method of claim 31, wherein Jebrak teaches the step of magnetic separation is performed with a magnetic field includes 500 gauss (6:1, within the range of 400 to 700 gauss).

---

***Dispersant Is Phosphate***

g. Regarding claim 7, Jebrak as modified teaches the method of claim 1, wherein Jebrak teaches step (e) may comprise magnetically separating the slurry into a first fraction composed essentially of ferrites and a second fraction composed essentially of magnetite, the first fraction being less magnetic than the second fraction (6:1, wherein ferrite requires 1000 gauss and magnetite requires 500 gauss to separate, so ferrite is less magnetic than magnetite). Jebrak does not expressly teach the ferrite being brown or magnetite being black, but said properties are expected since they are the same compositions. MPEP § 2112.01(I).

h. Regarding claims 8-9, Jebrak as modified teaches the method of claim 7, wherein Jebrak teaches the step of magnetic separation is performed with a magnetic field includes 500 gauss (6:1, within the range of "400 to 700 gauss" and "around 550 gauss," emphasis added).

In the alternative regarding claim 8, Jebrak teaches ferrite is extracted at 500 gauss, so would also be extracted at a higher magnetization, such as 550 gauss. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." MPEP § 2144.05(II).

i. Regarding claims **10** and **16**, Jebrak as modified teaches the method of claim 7, wherein Jebrak teaches magnetically separating ferrite from magnetite, which are expected to have different colors (see *supra*, and where a “pigment” is understood to be a substance capable of being used for adding a characteristic color). Furthermore, Jebrak teaches the ferrite and magnetite can be used to form pigments (page i ¶¶ 7 and page ii ¶¶ 5-6).

11. Claims 11-14, 17, 21, and 33 are rejected under 35 U.S.C. 103(a) as being obvious over Jebrak (Jebrak et al, Characterization of Steel Dust from the Sorel-Tracy Region and Technologies for their Treatment, Centre de Recherche en Environnement (1993) in view of Itoh et al (Itoh et al, Anomalous Increase of Coercivity in Iron Oxide Powder Coated with Sodium Polyphosphate, 1385-87 IEEE Trans. on Magnetics 13 (1977)) and *in the alternative* in view of Hwang (US 5,047,145), as provided *supra*, and further in view of Roux et al (US 6,022,406).

<p style="text-align: center;"><b><i>Refining Ferrite Pigments</i></b></p>
--

j. Regarding claims **11** and **33**, Jebrak as modified teaches the methods of claims 10 and 32 as provided *supra*, wherein Jebrak teaches: leaching the non-contaminated fraction with a solvent, to obtain a leached slurry; separating said leached slurry into a solid fraction and a liquid fraction containing constituents in said solvent; and drying said solid fraction to obtain dry pigments (Figures 8.3-8.4).

Jebrak as modified does not expressly teach the solid fraction or the dry pigments containing “ferrite pigments.” However, Jebrak teaches the magnetite and ferrite are magnetically separated (see *supra*) and that they can be used as pigments. Further, Roux

teaches electric arc furnace dust EAF dust is a class 1 waste (1:41-43) which can be rendered inert by various means for a variety of uses (2:7-9), where one such method is purifying the ferrite to form ferrite pigments (2:34-37), which may be used as pigments to provide color or for anticorrosion paint (3:26-28). As a result, it would have been obvious to a person of ordinary skill at the time of the invention to use the ferrite separated in the method of Jebrak as either pigments for color or in anticorrosion paint, as taught by Roux, in order to reduce the amount of waste product and make a useful product from a class 1 waste.

Roux teaches “dust from electrical steelworks has a very wide range of grain sizes, comprising fractions over the rang 1  $\mu\text{m}$  to 150  $\mu\text{m}$  (5:21-22) and further teaches filtering the solid fraction after leaching (7:66-8:1), but does not expressly teach “removing from the first fraction, particles having a grain size of 20 gm or more, to obtain a refined first fraction.” However, it would have been obvious to a person of ordinary skill at the time of the invention to (1) filter the first fraction and (2) filter the first fraction prior to leaching in order to (1) control the particle size distribution of the pigments in the resulting product and (2) filter prior to leaching in order to not waste leachant and energy on pigments not within the chosen particle size distribution. In the alternative, selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. MPEP § 2144.04(IV)(C).

Jebrak as modified does not expressly teach the removed particles “having a grain size of 20 gm or more.” However, “where the general conditions of a claim are disclosed

in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." MPEP § 2144.05(II).

k. Regarding claims 12-14, Jebrak as modified teaches the method of claim 11, wherein the solvent may be water, 12M sulfuric acid, and 12M nitric acid (Figure 8.3), which are used to solubilize and filter out the impurities from the ferrite (13:6-7).

Still regarding claim 12, Jebrak does not expressly teach "the ferrite pigments are ferrite pigments of a first grade." However, the ferrite pigments would be expected to be "of a first grade" since it teaches a substantially similar composition treated by a substantially similar process (see *supra*). MPEP § 2112.01(I). See also instant specification (12:3-6, teaching a first grade ferrite is made by using an optimal concentration of surfactant and subsequently leached with only water). Finally, the pigments would be expected to be ferrite for the reasons provided *supra*.

Still regarding claim 13, Jebrak does not expressly teach "the leaching is performed at a pH of 0.5 to 3 and the ferrite pigments are ferrite pigments of a second grade." However, Jebrak teaches using a 12M solution of sulfuric acid, wherein absent a teaching of unexpected results, the concentration of sulfuric acid does not patentably distinguish the instant invention. MPEP § 2144.05(II). Furthermore, the ferrite pigments would be expected to be "of a second grade" since it teaches a substantially similar composition treated by a substantially similar process (see *supra*). MPEP § 2112.01(I). See also instant specification (14:18-19, teaching a second grade ferrite is made by the same method as for a first grade, except subsequently leaching with sulfuric acid). Finally, the pigments would be expected to be ferrite for the reasons provided *supra*.



Still regarding claim 14, Jebrak does not expressly teach "the leaching is performed at a pH of up to 3, and the ferrite pigments are ferrite pigments of a third grade." However, Jebrak teaches using a 12M solution of nitric acid, wherein absent a teaching of unexpected results, the concentration of nitric acid does not patentably distinguish the instant invention. MPEP § 2144.05(II). Furthermore, the ferrite pigments would be expected to be "of a third grade" since it teaches a substantially similar composition treated by a substantially similar process (see *supra*). MPEP § 2112.01(I). See also instant specification (15:13-14, teaching a third grade ferrite is made by the same method as for a first grade, except subsequently leaching with nitric acid). Finally, the pigments would be expected to be ferrite for the reasons provided *supra*.

<p><b><i>Refining Magnetite Pigments</i></b></p>
--

1. Regarding claim 17, Jebrak as modified teaches the method of claim 16 as provided *supra*, wherein the magnetite is used to produce magnetite pigments (page i ¶7 and page ii ¶¶ 6-7), wherein Jebrak suggests the pigments may be formed of ferrite or magnetite individually or ferrite and magnetite in combination (see e.g. 32:3 and 33:6), since the type of pigments taught is not limited to only pigments containing both.

In the alternative, Hwang teaches magnetic separation of the fly ash dust, which contains both ferrite and magnetite (see *supra*), wherein the magnetic separation is performed in two steps, first using a high intensity magnetic field, such as about 1000 gauss, to remove the high and weaker magnetic material (ferrite and magnetite) and second using a lower magnetic field, such as 500 gauss to separate only the highly

magnetic material (magnetite) for use as a pigment (3:42-57). As a result, it would have been obvious to a person of ordinary skill at the time of the invention to use the magnetite separated in the method of Jebrak as pigments, as taught by Hwang, in order to make a useful product from EAF dust, reducing the amount of waste product.

Jebrak teaches filtering after leaching (Figure 8.4), but does not expressly teach the filtering is to separate fractions with particles greater and less than 6  $\mu\text{m}$ . However, Roux teaches "dust from electrical steelworks has a very wide range of grain sizes, comprising fractions over the range 1  $\mu\text{m}$  to 150  $\mu\text{m}$  (5:21-22) and further teaches filtering the solid fraction after leaching (7:66-8:1). As a result, it would have been obvious to a person of ordinary skill at the time of the invention to (1) filter the second fraction in order to control the particle size distribution of the pigments in the resulting product.

Jebrak as modified does not expressly teach the filtering at 6 $\mu\text{m}$ . However, "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." MPEP § 2144.05(II).

<p><b><i>Refining Pigments Containing Both Ferrite and Magnetite</i></b></p>
--

m. Regarding claim 21, Jebrak as modified teaches the method of claim 1 as provided *supra*, wherein Jebrak teaches leaching the slurry with 12M nitric acid; separating said leached slurry into a solid fraction and a liquid fraction containing

constituents soluble in nitric acid; and drying said solid fraction (Figures 8.3-84) to obtain dry pigments (33:6).

Jebrak does not expressly teach the “pH of about 3, to obtain a leached slurry with no or a controlled amount of ZnO which retard the setting of concrete” or the solid fraction and pigment “containing a mixture of ferrite and magnetite.” However, Jebrak teaches using a 12M solution of nitric acid, wherein absent a teaching of unexpected results, the concentration of nitric acid does not patentably distinguish the instant invention. MPEP § 2144.05(II). Furthermore, the solid fraction and pigments would be expected to be a mixture of magnetite and ferrite since Jebrak suggests the pigments may be formed of ferrite or magnetite individually or ferrite and magnetite in combination (see e.g. 32:3 and 33:6), since the type of pigments taught is not limited to only pigments containing both.

In the alternative, Hwang teaches magnetic separation of the fly ash dust, which contains both ferrite and magnetite (see *supra*), to form pigments where the pigments may be formed of only the more magnetic material (magnetite) or from all of the magnetic material (3:42-57, i.e., magnetite and ferrite). As a result, it would have been obvious to a person of ordinary skill at the time of the invention to not separate the mixture of ferrite and magnetite in Jebrak in making pigments composed of both in the method of Jebrak, since Hwang teaches pigments may be composed of a mixture of ferrite and magnetite.

Jebrak as modified does not expressly teach “removing from the slurry obtained in step (d), particles having a grain size of 60 gm or less, to obtain a refined slurry.”

However, Roux teaches “dust from electrical steelworks has a very wide range of grain sizes, comprising fractions over the range 1  $\mu\text{m}$  to 150  $\mu\text{m}$  (5:21-22) and further teaches filtering the solid fraction after leaching (7:66-8:1). As a result, it would have been obvious to a person of ordinary skill at the time of the invention to (1) filter the slurry and (2) filter the slurry prior to leaching in order to (1) control the particle size distribution of the pigments in the resulting product and (2) filter prior to leaching in order to not waste leachant and energy on pigments not within the chosen particle size distribution. In the alternative, selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. MPEP § 2144.04(IV)(C).

Jebrak as modified does not expressly teach the removed particles “having a grain size of 60  $\mu\text{m}$  or more.” However, “where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” MPEP § 2144.05(II).

12. Claim 15 is rejected under 35 U.S.C. 103(a) as being obvious over Jebrak (Jebrak et al, Characterization of Steel Dust from the Sorel-Tracy Region and Technologies for their Treatment, Centre de Recherche en Environnement (1993) in view of Itoh et al (Itoh et al, Anomalous Increase of Coercivity in Iron Oxide Powder Coated with Sodium Polyphosphate, 1385-87 IEEE Trans. on Magnetics 13 (1977)) and in the alternative in view of Hwang (US 5,047,145), as provided *supra*, and Roux et al (US 6,022,406), as provided *supra*, and further in view of Ayana et al (Ayana et al, Zinc-Ferrite Pigment for Corrosion Resistance, 381-388 Anti-Corrosion Methods and Mat'l 44 (1997)).

***Refining Ferrite Pigments, Continued***

Regarding claim **15**, Jebrak as modified teaches the method of claim 14, as provided *supra*, wherein Roux teaches ferrite from mill dust may be used as pigments to provide color or for anticorrosion paint (3:26-28), but does not expressly teach “wet grinding the solid fraction to obtain a forth grade of pigments having a finer mean grain size and a lower concentration of lead as compared to the ferrite pigments of the third grade.”

However, Ayana teaches ferrite used in anticorrosion paint compositions (381:1), wherein the ferrite was prepared by wet grinding in order to achieve better homogeneity of the product and to reduce the diffusion distances of the unreacted particles (382:2). As a result, it would have been obvious to a person of ordinary skill at the time of the invention to wet grind the ferrite pigments of Jebrak as modified, in order to provide a more homogeneous anticorrosive paint pigment and reduce diffusion distances between unreacted ferrite particles, as taught by Ayana.

13. Claims 18-19 are rejected under 35 U.S.C. 103(a) as being obvious over Jebrak (Jebrak et al, Characterization of Steel Dust from the Sorel-Tracy Region and Technologies for their Treatment, Centre de Recherche en Environnement (1993) in view of Itoh et al (Itoh et al, Anomalous Increase of Coercivity in Iron Oxide Powder Coated with Sodium Polyphosphate, 1385-87 IEEE Trans. on Magnetics 13 (1977)) and *in the alternative* in view of Hwang (US 5,047,145), as provided *supra*, and Roux et al (US 6,022,406), as provided *supra*, and further in view of Oulsnam et al (US 5,738,717).

***Refining Magnetite Pigments, Continued***

n. Regarding claim 18, Jebrak as modified teaches the method of claim 17 as provided *supra*, but does not expressly teach “the steps of milling said coarser fraction, and removing from the milled coarser fraction the particles having a grain size greater than 40  $\mu\text{m}$  and returning said particles for further milling, and a second finer fraction having particles with a grain size of less than 6  $\mu\text{m}$ , resulting in said coarser fraction containing particles having a grain size between 40 and 6  $\mu\text{m}$ .”

Oulsnam teaches taking the ferrous dust from mills and wet milling the particles to a size not more than 20  $\mu\text{m}$  (1:35-38 and 3:16-19), preferably not exceeding 10  $\mu\text{m}$  (2:1-2), wherein the particle size affects the tinting strength of the coloring pigment, wherein the smaller the particle size, the greater the tinting strength. As a result, it would have been obvious to a person of ordinary skill at the time of the invention to use the method of Oulsnam to further process the pigments of Jebrak as modified to improve the tinting strength of the coloring pigment.

Jebrak as modified does not expressly teach “removing from the milled coarser fraction the particles having a grain size greater than 40  $\mu\text{m}$  and returning said particles for further milling.” However, Oulsnam teaches the ground particles are not more than 20  $\mu\text{m}$ . So said limitation does not apply since none of the particles are greater than 40  $\mu\text{m}$ .

Jebrak as modified does not expressly teach removing from the milled coarser fraction...a second finer fraction having particles with a grain size of less than 6  $\mu\text{m}$ .”

However, Oulsnam teaches the particle size has an effect on the tinting strength of the pigment. As a result, it would have been obvious to a person of ordinary skill at the time of the invention to filter out the particles in the claimed range to control the particle

size distribution and resulting tinting strength of the pigment. See also MPEP § 2144.05(II).

As a result the remaining coarser fraction contains particles having a grain size between 6 and 40  $\mu\text{m}$ .

o. Regarding claim 19, Jebrak as modified teaches the method of claim 17 as provided *supra*, but does not expressly teach “wet grinding by attrition the coarser fraction to attain a mean grain size of approximately 0.3  $\mu\text{m}$ ; and filtering and drying the grinded coarser fraction, to obtain a magnetite pigment of a first grade.”

Oulsnam teaches taking the ferrous dust from mills and (f) wet milling (1:35-38, wherein reduction is by wet milling, in which at least some attrition is expected) the particle size to not more than 20  $\mu\text{m}$  (1:35-38), preferably not exceeding 10  $\mu\text{m}$  (2:1-2, overlapping the claimed range of mean grain size of approximately 0.3  $\mu\text{m}$ ), and (g) drying to result in magnetite pigments (2:19-20), wherein the particle size affects the tinting strength of the coloring pigment, wherein the smaller the particle size, the greater the tinting strength. As a result, it would have been obvious to a person of ordinary skill at the time of the invention to use the method of Oulsnam to further process the pigments of Jebrak as modified to improve the tinting strength of the coloring pigment.

Jebrak as modified does not expressly teach the step (f) wet grinding is “on the coarser fraction to attain a mean grain size of approximately 0.3  $\mu\text{m}$ .” However, it would have been obvious to a person of ordinary skill at the time of the invention to send the coarse particles with grain sizes greater than 6  $\mu\text{m}$  or more for wet grinding, since the

particles have a marketable value and the particles have been processed to a fairly pure state.

Jebrak does not expressly teach in step (g) "filtering" to "obtain a magnetite pigment of a first grade." However, Oulsnam teaches the particle size has an effect on the tinting strength of the pigment. As a result, it would have been obvious to a person of ordinary skill at the time of the invention to filter out the smaller particles to control the particle size distribution within the claimed range. Furthermore, the "first grade" is expected since Jebrak as modified teaches a substantially similar composition made by a substantially similar process. MPEP § 2112.01(I). See also the instant specification (50:1-4).

#### ***Art of Record***

14. *No art of record teaches or suggests the method steps of claim 20.*

#### ***Response to Arguments***

15. Applicant's arguments with respect to claims 1-4, 6-21, and 31-33 have been considered but are moot in view of the new ground(s) of rejection.

The applicants allege the declaration by Dr. Morency overcomes the prior rejections.

In response, the examiner refers to the response *supra* regarding the sufficiency of the declaration.

Furthermore, the examiner respectfully notes that the rejections *supra* are based on sodium metaphosphate and phosphate dispersants.



***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YOSHITOSHI TAKEUCHI whose telephone number is (571)270-5828. The examiner can normally be reached on Monday-Thursday 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/YOSHITOSHI TAKEUCHI/  
Examiner, Art Unit 1726

/Patrick Joseph Ryan/  
Supervisory Patent Examiner, Art Unit 1726